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A Synopsis of *Cousinia* sect. *Serratuloides* (Asteraceae) in Iran

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ABSTRACT. A synopsis of *Cousinia* Cassini sect. *Serratuloides* Bunge (Asteraceae) is presented. The new species *C. sheidaii* and *C. elburzensis*, collected from Markazi and Mazandaran provinces in Iran, respectively, are described and illustrated, and characters that distinguish them from their nearest relatives are given. A description of the section *Serratuloides* Bunge, an enumeration, and a key to its 13 species are given.

Key words: Asteraceae, *Cousinia*, Iran, section *Serratuloides*/*Serratuloideae*.

Cousinia Cassini (Asteraceae) is an Irano-Turanian genus of perennial, biennial, or annual herbs comprising about 690 species that grow in the montane areas and deserts of southwestern and central Asia (Attar, 2000). *Cousinia* sect. *Serratuloides* Bunge (as “*Serratuloideae*”) was delimited to include 11 species by Rechinger (1972, 1979). With the exception of *C. pterocaulos* (C. A. Meyer) Rechinger f., which grows in both Azerbaijan and Iran, all the remaining species of section *Serratuloides* are endemic to Iran.

Based on recent extensive fieldwork, the examination of numerous herbarium specimens, and extensive anatomical, chromosomal, and pollen studies (Mahdigholi, 2003), we expand the limits of section *Serratuloides* to include the 13 species enumerated here.

Species of *Cousinia* sect. *Serratuloides* have highly restricted distributions in Iran and the Talysh region of Azerbaijan. For example, *C. hypoleuca* Boissier, *C. crispa* Jauberti & Spach, *C. pinarocephala* Boissier, and *C. elburzensis* Attar, Mahdigholi & Ghahreman are confined to the Elburz mountains in northern Iran, Mazandaran province; *C. discolor* Bunge, *C. concolor* Bunge, and *C. adenostegia* Rechinger f. are restricted to the Binaloud mountains in northeastern Iran; *C. irritans* Rechinger f. is endemic to Shahvar mountain in Khorasan province; and *C. sheidaii* Attar, Ghahreman & Mahdigholi is endemic to the Tafresh mountains in Markazi province in central Iran. Most species grow on slopes at 1500–2400 m. Only *C. rechingeriae* Bornmueller is distributed in forest margins of Gorgan at 600–900 m (Golestan province, northeastern Iran).

Cousinia* sect. *Serratuloides Bunge, as “*Serratuloideae*,” Mém. Acad. Imp. Sci. Saint-Petersbourg, Sér. 7, 9(2): 32. 1865. TYPE: *Cousinia serratuloides* Boissier.

Perennial, branched herbs. Leaves continuously or interruptedly decurrent, herbaceous or coriaceous, lobed or dentate, spinose, glabrous or arachnoid. Heads few, singular, 1–5(–5.5) cm; flowers 30 to 190; phyllaries 55 to 185; phyllaries exappendiculate,

median phyllaries numerous, indistinctly constricted above the base or middle, gradually attenuate toward apex, olive-green to light or dark brown, ciliate at margin, papillose outside; receptacle bristles scabrous

or smooth. Corolla violet, purple, pink, or yellow, limb to $2 \times$ longer than tube; anther tube white, purple, pink or violet. Achenes longitudinally striate, scabrous, marginal ones curved, central ones straight.

KEY TO THE SPECIES OF *COUSINIA* SECT. *SERRATULOIDES* IN IRAN

- 1a. Leaves herbaceous or herbaceous-coriaceous; receptacle bristles smooth.
 - 2a. Outer and median phyllaries completely falcate *C. rechingerae*
 - 2b. Outer and median phyllaries not falcate.
 - 3a. Corolla yellow *C. olivieri* DC.
 - 3b. Corolla purple or violet, rarely white.
 - 4a. Heads 3.5–5.5(–6) cm diam.
 - 5a. Leaves interruptedly decurrent, rarely continuous, forming narrow wings *C. pinarocephala*
 - 5b. Leaves continuously decurrent, forming broad wings *C. pterocaulos*
 - 4b. Heads 2–3.5(–4) cm diam.
 - 6a. Heads cylindrical; phyllaries 100 to 130 *C. elburzensis*
 - 6b. Heads spherical; phyllaries 120 to 180.
 - 7a. Leaves completely crisped; median phyllaries spreading, rarely reflexed *C. crispa*
 - 7b. Leaves not crisped; median phyllaries reflexed, rarely spreading. *C. alfredii* Bornmueller & Gauba
 - 1b. Leaves coriaceous; receptacle bristles scabrous or subscabrous, rarely smooth.
 - 8a. Receptacle bristles scabrous, rarely some bristles smooth.
 - 9a. Heads 2–2.5(–3) cm diam.; flowers 100 to 140; lower leaf surface arachnoid or rarely glabrous . . . *C. irritans*
 - 9b. Heads 1.5–2(–2.5) cm diam.; flowers 90 or fewer; both leaf surfaces glabrous.
 - 10a. Median phyllaries spreading-reflexed *C. concolor*
 - 10b. Median phyllaries erect *C. adenostegia*
 - 8b. Receptacle bristles smooth, rarely some bristles scabrous.
 - 11a. Heads 2–2.5(–3) cm diam.; flowers 80 to 90 *C. sheidaii*
 - 11b. Heads smaller; flowers 30 to 55.
 - 12a. Both leaf surfaces white-arachnoid; receptacle bristles smooth *C. discolor*
 - 12b. At least one leaf surface not white-arachnoid; bristles scabrous.
 - 13a. Heads (1.5–)2–2.5 cm diam.; median phyllaries usually spreading; flowers 50 to 70 *C. hypoleuca*
 - 13b. Heads 1–1.5(–2) cm diam.; median phyllaries usually erect; flowers 30 to 50 . . . *C. serratuloides*

1. *Cousinia adenostegia* Rechinger f., Fl. Iranica 139A: 151. 1979. TYPE: Iran. Khorasan: Binaloud Mtns., Shaikh Abol-Hassan, 1500–2250 m, 30–31 July 1976, *Terme & Tehrani 35120-E* (holotype, W).

Distribution. Iran, endemic to Khorasan province.

Cousinia adenostegia, which is extremely rare and restricted to the Binaloud mountains, is very closely related to *C. concolor*, from which it is distinguished by having erect instead of spreading-reflexed median phyllaries. The species was not assigned to any section by Rechinger (1979), but all of its characters typically fit the sectional description provided above.

Selected specimen examined. IRAN. **Khorasan:** Neyshabour, Binaloud Mtns., Zoshk to Dizbad, ca. 2100 m, *A. Ghahreman, F. Attar & K. Mahdigholi 25399* (TUH).

2. *Cousinia alfredii* Bornmueller & Gauba, Repert. Spec. Nov. Regni Veg. 49: 264. 1940. TYPE: Iran. Mazandaran: Kelar Dasht, Alam Kuh, 1300 m, *Gauba 629* (holotype, B; isotype, K).

Distribution. Iran, endemic to Mazandaran province on the southern and northern slopes of Elburz Mountains and known only from the type collection.

Cousinia alfredii is easily distinguished from *C. crispa* by its falcate-squarrose phyllaries.

3. *Cousinia concolor* Bunge, Mém. Acad. Imp. Sci. Saint-Petersbourg, Sér. 7. 9(2): 33. 1865. TYPE: Iran. Khorasan: Binaloud Mtns., betw. Neyshabur & Meshhad, July 1858, *A. A. Bunge & Bienert s.n.* (holotype, LE; isotypes, K, P).

Distribution. Iran, Khorasan province, endemic to the southern slopes of the Binaloud mountains.

Cousinia concolor is similar to *C. discolor* but differs in its non-arachnoid habit and uniformly colored leaves.

Selected specimen examined. IRAN. **Khorasan:** Neyshabour, Binaloud Mtns., Pivezhen village, 2100 m, *F. Attar & K. Mahdigholi, 27646* (TUH).

4. *Cousinia crispa* Jaubert & Spach, Ill. Pl. Orient. 2: 81. 1846. TYPE: Iran. N Tehran, *P. M. R. Aucher-Eloy 4807* (holotype, G; isotypes, K, W).

Distribution. Iran, Tehran province, endemic to the Elburz mountains. *Cousinia crispa* is widely distributed on the southern slopes of the central Elburz mountains.

Selected specimen examined. IRAN. **Tehran:** Haraz rd., E of Tehran, Lasem rd., 2100 m, *F. Attar & K. Mahdigholi* 28693 (TUH).

5. ***Cousinia discolor*** Bunge, Mém. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 7, 9(2): 33. 1865. TYPE: Iran. Khorasan: subalpine areas above "Dsche-gar" betw. Neyshabur and Meshhad, July 1858, *A. A. Bunge & Bienert s.n.* (holotype, LE; isotypes, K, P).

Distribution. Iran, Khorasan province, endemic to the Binaloud mountains.

Cousinia discolor is considered a very rare species and is known thus far from the two collections described here (*Bunge & Bienert s.n.*; *A. Ghahreman, F. Attar & K. Mahdigholi* 25396), made 144 years apart.

Selected specimen examined. IRAN. **Khorasan:** Neyshabour Mtns., Dizbad to Zoshk, ca. 2200 m, 8 Aug. 2000, *A. Ghahreman, F. Attar & K. Mahdigholi* 25396 (TUH).

6. ***Cousinia elburzensis*** Attar, Mahdigholi & Ghahreman, sp. nov. TYPE: Iran. Mazandaran: N slopes of central Elburz Mtns., Eshkvar, 1700 m, *F. Attar & K. Mahdigholi* 32192 (holotype, TUH; isotype, TUH). Figure 1.

Herba perennis 20–30 cm alta. Folia herbacea, discoloria, supra viridia, arachnoidea, subtus cinereo-arachnoidea, lanceolato-elliptica, petiolata vel sessilia, superiora reducta. Capitula singularia, terminalia, 2–3 cm diam.; involucre cylindricum, arachnoideum; phyllaria 100 ad 130, intermedia erecto-patentia, dorso virideo-olivaceo; receptaculi setae laeves. Flores 60 ad 80; corolla 15–18 mm longa, purpurea, tubo 6–8 mm longo, limbo 10–11 mm longo; lacinae 3–5 mm longae; antherarum tubus albus, glaber. Achaenia 4–5 × 1.5–2.5 mm, obovata, cinerea, atrimaculata; pappus caducus.

Perennial, 20–30 cm tall, branched at middle; stem and branches sparsely arachnoid. Leaves herbaceous, discolored, continuously or interruptedly decurrent, upper surface dark green, arachnoid, lower surface grayish green, with dense arachnoid hairs; basal leaves lanceolate, 10–15 × 2–4 cm, pinnatifid or pinnatisect, shortly petiolate, margin dentate, with spines 2–6 mm long; lower stem leaves sessile, lanceolate, 5–7 × 2–3 cm, pinnatisect or pinnatifid, with small and large lobes and spines up to 5 mm long; median leaves lanceolate to elliptic, 3–5 × 1.5–2 cm, pinnatifid or sometimes pinnatisect; uppermost leaves gradually smaller and reduced, near the heads. Heads solitary, terminal, 2–3 cm diam.; involucre cylindrical, arachnoid, 2–2.5 × 1–1.5 cm; phyllaries 100 to 130; outer phyllaries reflexed, 8–12 × 1–2 mm, constricted above the base, gradually tapering to the apex into a long spiny tip, olive green

above; median phyllaries erect or erect-spreading, 12–18 mm, olive green, constricted above the base; inner phyllaries erect, 18–21 mm, pale brown, ciliate in middle at margin; receptacle bristles smooth, 15–20 mm. Flowers 60 to 80; corolla purple, 15–18 mm long, tube 6–8 mm, limb 10–11 mm, limb lobes 3–5 mm; anther tube white, glabrous. Achenes 4–5 × 1.5–2.5 mm, obovate, attenuate toward base, gray with black blotches; pappus caducous.

Cousinia elburzensis is most closely related to *C. pinarocephala*, from which it differs by having heads 2–3 (vs. 4–5.5) cm diam., 100 to 130 (vs. 120 to 165) phyllaries, inner phyllaries 18–21 (vs. 21–24) mm long, and 60 to 80 (vs. 100 to 160) flowers per head. Both species have a similar geographical range in Iran.

7. ***Cousinia hypoleuca*** Boissier, Fl. Orient. 3: 464. 1875. TYPE: Iran. Tehran: Shahrestanak, s.d., *Kotschy* 557 (holotype, W).

Distribution. Iran, endemic to Tehran province.

Cousinia hypoleuca, which is a fairly common species in the central Elburz mountains, is closely related to *C. serratuloides* (the sectional type). *Cousinia hypoleuca* is readily distinguished from *C. serratuloides* by its erect-spreading phyllaries and larger head.

Selected specimen examined. IRAN. **Tehran:** Karaj, Kandavan pass, 2700 m, *Attar & Mahdigholi* 27824 (TUH).

8. ***Cousinia irritans*** Rechinger f., Ann. Naturhist. Mus. Wien 57: 72. 1950. TYPE: Iran. Khorasan: Shahrud-Bastam, Raheh, S slope of Shahvar Mtns., above Nekarman, 2700 m, *K. H. Rechinger* 5955 (holotype, W).

Distribution. Iran, endemic to Khorasan Province.

Selected specimen examined. IRAN. **Khorasan:** Semnan, Shahrud to Azad-Shahr, Nekarman, 1600 m, *Ghahreman & Attar* 21893 (TUH).

9. ***Cousinia olivieri*** DC., Prodr. 6: 552. 1838, non *C. olivieri* Jaubert & Spach, Ill. Pl. Orient. 2: t. 172. 1846. TYPE: Iran. 1822, *Olivier s.n.* (holotype, G).

Distribution. Iran, endemic to the central Elburz mountains.

Cousinia olivieri is considered a very rare species and is known thus far only from two collections (*Olivier s.n.*; *F. Attar & K. Mahdigholi* 30963) separated by 180 years. *Cousinia olivieri* is closely related to *C. pterocaulos*, but differs in its yellow corolla.



Figure 1. *Cousinia elburzensis* Attar, Mahdigholi & Ghahreman. —A. Habit. —B. Outer phyllaries. —C. Middle phyllaries. —D. Inner phyllaries. Scale bars: A–D = 1 cm. Drawn from the holotype Attar, Mahdigholi & Ghahreman 32192 (TUH).

Selected specimen examined. IRAN. **Mazandaran:** Lashgan, 1700 m, 14 July 2002, F. Attar & K. Mahdigholi 30963 (TUH).

Mazandaran: Allamut Mtns., P. M. R. Aucher-Eloy 4808 (holotype, G; isotype, W).

10. *Cousinia pinarocephala* Boissier, Diagn. Pl. Orient., Ser. 1, 6: 121, 1845. TYPE: Iran.

Distribution. Iran, endemic to Mazandaran province, widely distributed on the northern slopes of the central Elburz mountains.

Cousinia pinarocephala is closely related to *C. pterocaulos*, but the leaves of *C. pterocaulos* are continuously decurrent, forming broad wings.

Selected specimen examined. IRAN. **Mazandaran:** Kelar Dasht, Rudbarak, 2350 m, Attar & Mahdigholi 28699 (TUH).

11. *Cousinia pterocaulos* (C. A. Meyer) Rechinger f., Fl. Iranica, 90: 95. 1979. Basionym: *Carthamus pterocaulos* C. A. Meyer, Verz. Pfl. Casp. Meer. 67. 1831. TYPE: Azerbaijan. Talish, s.d., C. A. Meyer s.n. (holotype, LE; isotypes, G, W).

Distribution. Iran, Azerbaijan: Gilan and Tehran provinces. *Cousinia pterocaulos* is widely distributed in Gilan and Mazandaran (Firouz-Kuh, Gaduk pass).

Some plants of *Cousinia pterocaulos* have white corollas and anther tubes, while most of the others have pink or violet flowers. However, because this variation is observed within any given population, this floral color variation is not accorded any formal rank.

Selected specimen examined. IRAN. **Gilan:** Talish, Aghvelar village, 1600 m, Attar & Mahdigholi 32200 (TUH).

12. *Cousinia rechingeriae* Bornmueller, Repert. Spec. Nov. Regni Veg. 48: 133. 1940. TYPE. Iran. Golestan: betw. Bojnurd & Tappeh Moraveh, 1300 m, s.d., K. H. Rechinger 1927 (holotype, W).

Distribution. Iran, endemic to Golestan Province. This species is widely distributed along forest margins of Gorgan province.

Cousinia rechingeriae is closely related morphologically to *C. alfredii*, but they are distinctly separated by their geographical distributions. *Cousinia rechingeriae* is distributed ca. 900 m above sea level at forest margins in northeastern Iran, and *C. alfredii* can be found at above 2000 m elevation in the central Elburz mountains. The two species differ morphologically by the large head (4–4.5 cm) and light green habit of *C. rechingeriae* versus the smaller head (2–2.5 cm) and deep green habit of *C. alfredii*.

Selected specimen examined. IRAN. **Golestan:** Gorgan, Kalaleh, before Kaleh Mishan, Attar & Mahdigholi 28689 (TUH).

13. *Cousinia serratuloides* Boissier, Diagn. Pl. Orient., Ser. 1, 6: 118. 1846. TYPE. Iran. Elburz Mtns., sine loc., s.d., P. M. R. Aucher-Eloy 4804 (holotype, G; isotypes, K, W).

Distribution. Iran, endemic to the southern slopes of the central Elburz mountains.

Cousinia serratuloides is a very rare species and is known thus far only from two collections (P. M. R. Aucher-Eloy 4804; Attar & Mahdigholi 32205). The second gathering was collected 156 years after the type collection.

Selected specimen examined. IRAN. **Tehran:** Haraz rd., before Lasem village, 2400 m, 8 July 2002, Attar & Mahdigholi 32205 (TUH).

14. *Cousinia sheidaii* Attar, Ghahreman & Mahdigholi, sp. nov. TYPE: Iran. Markazi province: 15 km to Tafresh from Ashtian, 2350 m, 17 June 1998, A. Ghahreman & F. Attar 21817 (holotype, TUH; isotype, TUH). Figure 2.

Herba perennis, 50–80 cm alta. Folia coriacea, supra viridia, subtus arachnoidea, lanceolata, sessilia, pinnatifida vel pinnatisecta, superiora diminuta. Capitula singularia, terminalia, spinis late patentibus inclusis 2–2.5(–3) cm diam.; involucre cylindricum, arachnoideum; phyllaria 80 ad 100, intermedia patenti-erecta, dorso viridio-olivaceo, papilloso-scabro, margine ciliata; receptaculi setae laeves. Corolla purpurea, 17–20 mm longa, tubus longitudine limborum; lacinae 2.5–4 mm longae. Antherarum tubus roseus vel purpureus, glaber. Achaenia 6–7 × 2.5–3 mm, obovata, laevia, indistincte striata, pallide brunnea vel cinerea, atrimaculata; pappus caducus.

Perennial, 50–80 cm tall, branched from middle; stem and branches irregularly furrowed, arachnoid. Leaves coriaceous, discolored, upper surface light green, at first arachnoid, then almost glabrous, lower surface densely arachnoid; basal leaves lanceolate, sessile, 20–30 × 6–8 cm, pinnatifid or pinnatisect, margin dentate with 3–10 mm long spines; lower and median stem leaves 5–25 × 4–5 cm, dentate, with ca. 7 mm long spines; upper leaves gradually smaller near the heads. Heads solitary, terminal, 2–2.5(–3) cm diam. (including spines); involucre cylindrical, arachnoid; phyllaries 80 to 100; outer phyllaries reflexed-spreading, 13–18 mm, 3–3.5 mm wide in widest part, constricted at middle, gradually attenuate toward spinose apex, olive green to light brown above, papillose outside except on lower third, ciliate at margin; median phyllaries spreading-erect, 15–20 mm, olive green to brown on upper half, papillose outside, ciliate at margin; inner phyllaries erect, 20–25 mm, upper half pale brown, papillose at middle, ciliate at margin; receptacle bristles smooth, very rarely scabrous. Flowers 80 to 90; corolla purple, drying yellow, 17–20 mm long, tube and limb equal, lobes 2.5–4 mm; anther tube pink to purple, glabrous. Achenes 6–7 × 2.5–3 mm, obovate, attenuate to the base, almost smooth, indistinctly striate, pale brown to gray, with sparse blotches; pappus caducous.

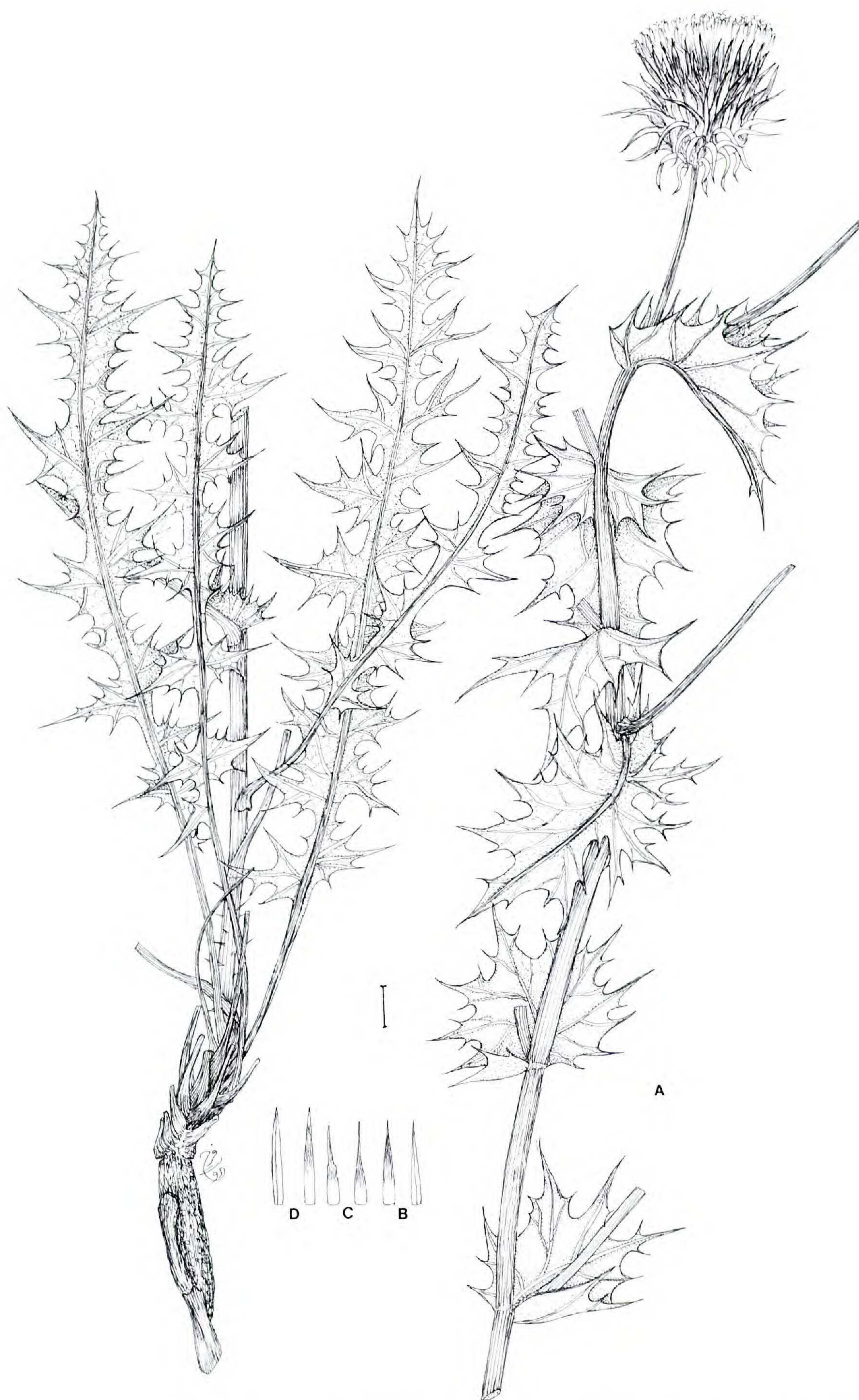


Figure 2. *Cousinia sheidatii* Attar, Ghahreman & Mahdigholi. —A. Habit. —B. Outer phyllaries. —C. Middle phyllaries. —D. Inner phyllaries. Scale bars: A–D = 1 cm. Drawn from the holotype Attar, Mahdigholi & Ghahreman 21817 (TUH).

Distribution. Iran, Markazi province. This species is restricted to a small patch in the locality of the type specimen.

Cousinia sheidaii is closely related to *C. irritans* and is distinguished by the following characters: outer phyllaries 3–3.5 mm wide (vs. 2.5–3 mm), inner phyllaries 20–25 mm long (vs. 18–20 mm), flowers 80 to 90 (vs. 100 to 140), and pale brown to gray (vs. brown) phyllaries. The geographical ranges of the species are distinct, with *C. sheidaii* restricted to Markazi province (central Iran) and *C. irritans* endemic to Khorasan province (eastern Iran).

Paratype. IRAN, **Markazi:** 8 km from Tafresh to Ashlian, 2610 m, 21 July 2001, *A. Chahreman, F. Attar & K. Mahdigholi* 27610 (TUH).

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